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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/683,267	12/06/2001	Joanna L. Duncan	AL.US.9	3355

23731 7590 02/26/2003

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EXAMINER	
LISH, PETER J	
ART UNIT	**PAPER NUMBER**
1754	8

DATE MAILED: 02/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/683,267	DUNCAN ET AL.	
	Examiner	Art Unit	
	Peter J Lish	1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 March 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) *17-29* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4-5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-16, drawn to a process for the removal of gaseous components, classified in class 423, subclass 210.

II. Claims 17-29, drawn to an apparatus for the removal of gaseous components, classified in class 95, subclass 149.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be used to practice another and materially different process such as the separation of hydrogen sulfide from a gaseous mixture.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Phillip Decker on February 21, 2003, a provisional election was made without traverse to prosecute the invention of Group I, claims 1-16. Affirmation of this election must be made by applicant in replying to this Office action. Claims 17-29 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al. (USPN 5,041,271) taken with Alix et al. (USPN 5,871,703) taken with Senjo et al. (USPN 4,035,470).

Aoki et al. disclose a process wherein waste gas containing SO_x and NO_x are subjected to oxidation by electron beam irradiation, then reacted with ammonia to form ammonium sulfate and ammonium nitrate. The ammonium sulfate and ammonium nitrate are then removed from the system using an electrostatic precipitator. Aoki et al. also teach that the average ratio of SO_x to NO_x of the waste gas mixture is about 5:1 (column 6, lines 65-66). Aoki et al. do not disclose that Hg present in the waste gas may be treated by the system. Additionally, Aoki et al. do not explicitly teach that the ammonia be introduced as a scrubbing solution with a specific pH, nor do they explicitly teach irradiation by a dielectric barrier electric discharge apparatus.

Alix et al. disclose a process wherein waste gas containing SO_2, NO_x, and Hg are treated by irradiation using an electrical discharge apparatus, such as an electron beam, corona, or dielectric barrier apparatus. The SO_2 is partially converted to sulfuric acid, the NO is partially converted to NO_2, the NO_2 is partially converted to nitric acid, and the Hg is converted to HgO, which is readily collected on a wet electrostatic precipitator. It would have been obvious to one of ordinary skill at the time of invention to substitute the dielectric barrier discharge apparatus of Alix et al. for the electron beam apparatus in the process of Aoki et al. in order to perform the same oxidation irradiation treatment. It also would have been obvious for one of ordinary skill at the time of invention to use the process of Aoki et al. to remove mercury in addition to NO_2 and SO_2 from the waste gas stream as taught by Alix et al., because emissions from the combustion exhaust of fossil fuel fired plants contain all of these pollutants. Furthermore, while Aoki et al. do not explicitly teach that the electrostatic precipitator of their process is a wet ESP, it would have been obvious to one of ordinary skill at the time of invention to use the wet ESP of Alix et al. in order to ensure that HgO components are removed from the gas. Alix et al. do not teach the use of a scrubbing solution of ammonia, however they do teach that after the irradiation treatment, the sulfuric acid, nitric acid, HgO, NO_2, and SO_2 are separated from the gas stream.

Senjo et al. disclose a process wherein sulfur oxides and nitrogen oxides are removed from waste gas by oxidizing NO to NO_2 and then scrubbing the gas with an aqueous scrubbing solution containing ammonium sulfite in order to produce ammonium sulfate and ammonium nitrate. The pH of the scrubbing solution is preferably in the range from 6.5 to 8.5 (column 4, lines 39-45). It would have been obvious to one of ordinary skill at the time of invention to use a scrubbing solution containing ammonia to react with the acid components of the waste gas, as

taught by Aoki et al., and further containing ammonium sulfite at a pH of between 6.5-8.5 to react with the NO_2 and SO_2 components, as taught by Senjo et al, in the process of Aoki et al. in order to ensure a more complete removal of the gaseous pollutants. It is noted that the scrubbing solution will also contain ammonium sulfate, as it is the product of both the reaction of ammonia with the acid components and of ammonium sulfite with the NO_2 and SO_2 components.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Lish whose telephone number is 703-308-1772. The examiner can normally be reached on 9:00-6:00 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 703-308-3837. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-305-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

PL
February 21, 2003

STUART L. HENDRICKSON
PRIMARY EXAMINER